SLO Review cont. (Honors topics) Key

Name ______________________________ Date ____________ Period ________

Solve the following equations.

1. $2(x-1)^{\frac{4}{3}}+4=36$

$\quad\quad\quad\quad\;\; -4 \;\; -4$

$\frac{2(x-1)^{4/3}}{2}=\frac{32}{2}$

$\left((x-1)^{4/3}\right)^{3/4}=(16)^{3/4}$

$x-1=\pm 8$

$x=\pm 8+1$

$\boxed{x=9,-7}$

2. $e^{-2x}+2e^{-x}=3$ (hint: use u-substitution)

let $u=e^{-x}$

$u^2+2u-3=0$

$(u+3)(u-1)=0$

$u=-3 \quad u=1$

$\cancel{e^{-x}=-3}$

$e^{-x}=1$

$\boxed{x=0}$

3. Find the inverse of the function.

$f(x)=\log(x+4)-7$

$x=\log(y+4)-7$

$x+7=\log(y+4)$

$10^{(x+7)}=y+4$

$\boxed{f^{-1}(x)=10^{(x+7)}-4}$

4. Use the unit circle to find the exact value of $\sec\frac{5\pi}{4}$.

$\sec\frac{5\pi}{4}=\frac{1}{\cos\frac{5\pi}{4}}$

$=\boxed{-\sqrt{2}}$

5. Determine the domain for the rational function.

$f(x)=\frac{x+2}{3x^2-20x-32}$ ← Factor!

$(3x+4)(x-8)$

$3x+4\neq 0 \quad x-8\neq 0$

$x\neq -4/3 \quad x\neq 8$

$\boxed{\text{Domain: } (-\infty,-4/3)\cup(-4/3,8)\cup(8,\infty)}$

6. Use symmetry (or even odd properties) to find the exact values of sin Θ and cos Θ for

$\Theta=-\frac{4\pi}{3}$.

$\sin\left(-\frac{4\pi}{3}\right)=-\sin\left(\frac{4\pi}{3}\right)=\boxed{\frac{\sqrt{3}}{2}}$

$\cos\left(-\frac{4\pi}{3}\right)=\cos\left(\frac{4\pi}{3}\right)=\boxed{-\frac{1}{2}}$

7. What are the rectangular coordinates of the polar coordinates $(3,\frac{2\pi}{3})$?

$x=r\cos\theta \quad , y=r\sin\theta$

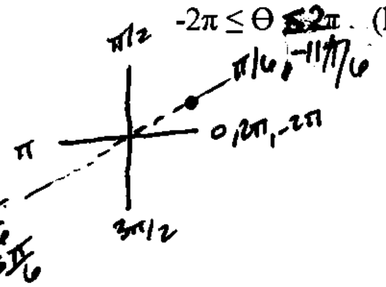
$x=3\cos\frac{2\pi}{3} \quad y=3\cdot\sin\frac{2\pi}{3}$

$x=3\cdot\frac{-1}{2} \quad y=3\cdot\frac{\sqrt{3}}{2}$

$x=\frac{-3}{2} \quad y=\frac{3\sqrt{3}}{2}$

$\boxed{\left(-\frac{3}{2},\frac{3\sqrt{3}}{2}\right)}$

8. Find all polar coordinates for the point $(2,\frac{\pi}{6})$ for $-2\pi\le\Theta\le 2\pi$. (hint there are 3 points)



$\boxed{\begin{matrix}(2,-\frac{11\pi}{6})\\(-2,\frac{7\pi}{6})\\(-2,-\frac{5\pi}{6})\end{matrix}}$

9. Find the polar equation for the given Cartesian (rectangular) equation $y^2 = 3x$.

$y = r\sin\theta$, $x = r\cos\theta$

$(r\sin\theta)^2 = 3r\cos\theta$

$\frac{r^2\sin^2\theta}{r\sin^2\theta} = \frac{3r\cos\theta}{r\sin^2\theta} \Rightarrow \boxed{r = \frac{3\cos\theta}{\sin^2\theta}}$

10. What is the polar (trig.) form of the complex number $z = 1 - \sqrt{3}\, i$? → 4th quadrant.

$r = \sqrt{(1)^2+(-\sqrt{3})^2} = \sqrt{1+3} = 2$

$\theta = \tan^{-1}\left(-\frac{\sqrt{3}}{1}\right) = 300°$ or $\frac{5\pi}{3}$

$\boxed{z = 2\left(\cos\left(\frac{5\pi}{3}\right) + i\sin\left(\frac{5\pi}{3}\right)\right)}$

11. Find the product of the complex numbers $z_1 = 2(\cos\frac{\pi}{3} + i\sin\frac{\pi}{3})$ *and* $z_2 = 3(\cos\frac{\pi}{4} + i\sin\frac{\pi}{4})$.

$z_1 \cdot z_2 = 2 \cdot 3\left(\cos\left(\frac{\pi}{3}+\frac{\pi}{4}\right) + i\sin\left(\frac{\pi}{3}+\frac{\pi}{4}\right)\right)$

$\boxed{= 6\left(\cos\left(\frac{7\pi}{12}\right) + i\sin\left(\frac{7\pi}{12}\right)\right)}$

12. Each time a ball bounces the height of the ball decreases after each bounce. If a ball is dropped 12 inches from the ground and after the first bounce reaches a height of 11.16 inches, and after each bounce the height decreases by the same percentage, what is the total distance the ball bounces when it comes to rest? (Hint: take into account the ball is going up then down)

sum of an infinite geometric series: $S = \frac{a}{1-r}$

$a = 12$, $r = \frac{11.16}{12} = .93$

$S = \frac{12}{1-.93} = 171.42$

$(171.42 \cdot 2) - 12 = \boxed{330.85 \text{ inches}}$